

PATENT ABSTRACTS OF JAPAN

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(54) INTERIOR SOUND REPRODUCING DEVICE

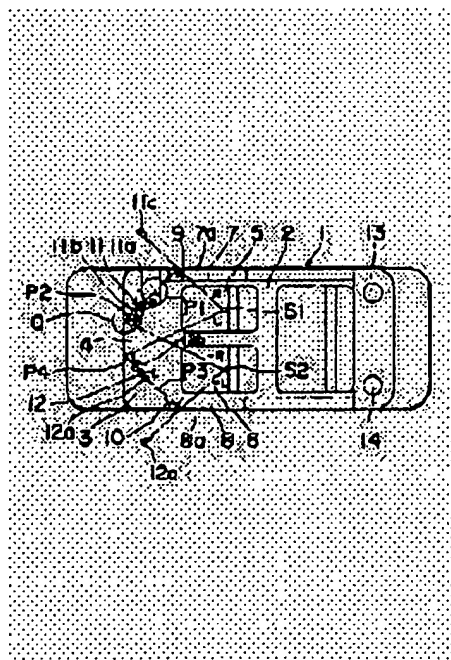
(57)Abstract:

PURPOSE: To provide an interior sound reproducing device which locates images at the respective centers of a driver's seat and an assistant driver's seat.

CONSTITUTION: Speakers 9 and 10 of lower and middle frequency range are internally packaged in front doors 7 and 8 at both sides, and a first and a second dipole sound source 11 and 12 are mounted on a dash-board 3 while being aligned with the respective extension lines of the center lines of a driver's seat 5 and an assistant driver's seat 6. The first dipole sound source

11 is made up of horn speakers 11a and 11b which are located back to back, and the second dipole sound source 12 is similarly made up of horn speakers 12a and 12b. Therefore, when signals R are inputted into the

speakers 9 and 10, and when signals R, -R, -L and L are inputted into L high frequency range horn speakers 11a, 11b, 12a and 12b, sound from the horn speakers 11a and 12a reaches the driver's seat 5 and the assistant driver's seat 6 while being reflected by side windows 7a and 8a, and sound from the horn speakers 11b and 12b reaches the driver's seat 5 and the assistant driver's seat 6 while being reflected by a front window 4. By this constitution, images are thereby located at the respective centers of the driver's seat and the assistant driver's seat.



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CLAIMS

[Claim(s)]

[Claim 1] The vehicle indoor sound system constituted so that it might have the loudspeaker and signal-processing means for low-pass ones and the sound from a dipole sound source and the sound from the loudspeaker for inside low-pass might arrive at a listening location at coincidence while being attached in the dipole sound source, and the front door or dashboard for the high region playback attached on the dashboard.

[Claim 2] The 1st dipole sound source attached on the dashboard near the driver's seat as said dipole sound source sideways or slanting sideways one, It has the 2nd dipole sound source attached on the dashboard near the passenger seat sideways or slanting sideways one. The sound emitted from the 1st sound source among the 1st sound source and the 2nd sound source which constitute said 1st dipole sound source reflects in the side window of a drivers side, and reaches to a driver's seat. The sound emitted from the 2nd sound source reflects in a front window, and reaches to a passenger seat. The sound emitted from the 3rd sound source among the 3rd sound source and the 4th sound source which constitute the 2nd dipole sound source reflects in the side window of a passenger side, and reaches to a passenger seat. The vehicle indoor sound system characterized by constituting so that the sound emitted from the 4th sound source may reflect in a front window and may reach to a driver's seat.

[Claim 3] The vehicle indoor sound system according to claim 1 or 2 characterized by enabling it to change the phase of the signal to each sound source which constitutes said dipole sound source.

[Claim 4] The vehicle indoor sound system according to claim 1 or 3 characterized by enabling it to delay the input signal to the loudspeaker for said inside low-pass with said signal-processing means.

[Claim 5] Said dipole sound source is a vehicle indoor sound system according to claim 1 or 2 characterized by having carried out the loudspeaker for high regions back to back, and constituting it.

[Claim 6] The vehicle indoor sound system according to claim 1 or 2 characterized by using a horn loudspeaker for said loudspeaker for high regions.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to a suitable vehicle indoor sound system to start the sound system for mount, especially improve the sound-source normal position.

[0002]

[Description of the Prior Art] As the conventional sound equipment for mount was shown in drawing 3, the loudspeakers 31 and 32 for high regions were attached in the vehicle room 2 of the Sedan type automobile 1 at a 7 or 8 front door front pillar or both the corners of a dashboard 3, and the loudspeakers 9 and 10 for inside low-pass were attached in front doors 7 and 8.

[0003] In any case, direct sound arrived at the driver's seat or the passenger seat, but since the location of a driver's seat and a passenger seat is unsymmetrical and distance differed to these loudspeaker locations, the image normal position was partial.

[0004] The physics top was impossible, although the loudspeaker needed to be attached so that it might be applicable also to which of a driver's seat and a passenger seat in order to improve this phenomenon.

[0005]

[Problem(s) to be Solved by the Invention] however, the above-mentioned conventional sound equipment for mount -- DSP (Digital Signal Processor) etc. -- even if it was going to delay a signal and was going to orientate an image in a listener's center, a driver's seat and a passenger seat were not able to be satisfied to coincidence.

[0006] Moreover, it was difficult to have made a sound orientate about a sound which is orientated to Lch or Rch in addition to the location of each loudspeaker.

[0007] This invention is made in view of the above-mentioned point, and the place made into that purpose cancels the fault of the conventional example, and is located in the place which offers the vehicle indoor sound system which an image orientates in the center of a driver's seat and each passenger seat.

[0008]

[Means for Solving the Problem] While being attached in the dipole sound source, and the front door or dashboard for the high region playback attached on the dashboard, the vehicle indoor sound system of this invention is equipped with the loudspeaker and signal-processing means for low-pass one, and it constitutes them so that the sound from a dipole sound source and the sound from the loudspeaker for inside low-pass may arrive at a listening location at coincidence.

[0009] Moreover, the 1st dipole sound source attached on the dashboard near the driver's seat as said dipole sound source sideways or slanting sideways one, It has the 2nd dipole sound source attached on the dashboard near the passenger seat sideways or slanting sideways ones. The sound emitted from the 1st sound source among the 1st sound source and the 2nd sound source which constitute said 1st dipole sound source reflects in the side window of a drivers side, and reaches to a driver's seat. The sound emitted from the 2nd sound source reflects in a front window, and reaches to a passenger seat. It constitutes so that the sound emitted from the 3rd sound source among the 3rd sound source and the 4th

sound source which constitute the 2nd dipole sound source may reflect in the side window of a passenger side, and may reach to a passenger seat, the sound emitted from the 4th sound source may reflect in a front window and it may reach to a driver's seat.

[0010] Moreover, it enables it to change the phase of the signal to each sound source which constitutes said dipole sound source with said signal-processing means.

[0011] Moreover, it enables it to delay the input signal to the loudspeaker for said inside low-pass with said signal-processing means.

[0012] Moreover, said dipole sound source carries out the loudspeaker for high regions back to back, and constitutes it.

[0013] Furthermore, a horn loudspeaker is used for said loudspeaker for high regions.

[0014]

[Function] Since according to this invention the loudspeaker for inside low-pass is arranged by a front door or the dashboard, a dipole sound source is attached on a dashboard and it is controlled by the signal-processing means, an image orientates in each listening location (a driver's seat and passenger seat).

[0015] Moreover, since the sound emitted from the 2nd sound source of the sound emitted from the 1st sound source of the 1st dipole sound source and the 3rd sound source of the 2nd dipole sound source and the 1st dipole sound source and the 4th sound source of the 2nd dipole sound source arrives at a driver's seat and a passenger seat through the path of the abbreviation equal distance, respectively, an image orientates to coincidence in the center of a driver's seat and each passenger seat.

[0016] Moreover, since it enables it to change the phase of the signal to each sound source which constitutes a dipole sound source, directional characteristics like the broken-line section Q which change the phase of the signal to each sound source 180 degrees, respectively, and are shown in drawing 1 can be given.

[0017] Moreover, since the input signal to an inside woofer can be delayed to a dipole sound source, and the sound from the loudspeaker for inside low-pass is delayed and it can arrive at a driver's seat and a passenger seat to the sound emitted from two dipole sound sources later than coincidence or it, an image is orientated in the center of a driver's seat and each passenger seat.

[0018] Moreover, since the loudspeaker for high regions is made a dipole sound source back to back, hard flow is turned to ** and the horn loudspeaker is moreover used for this loudspeaker, the outstanding directivity in a high region can be obtained.

[0019]

[Example] The example of the vehicle indoor sound system concerning this invention is explained based on drawing 1 and drawing 2. In addition, the same sign is given to the same part as the conventional example, and the explanation is omitted.

[0020] The top view and drawing 2 which show the example for which drawing 1 carried out this invention by Sedan type automobile are the block diagram showing the example of the loudspeaker connection used in order to carry out this invention.

[0021] As for 2, as for a vehicle room and 4, in drawing, a front window and 5 are a passenger seat and the side window where a driver's seat and 6 were prepared in 7a, and 8a was prepared in front doors 7 and 8. 9 and 10 are the loudspeakers for inside low-pass, they turn the inside to both the front doors 7 and 8, and interior is carried out to bilateral symmetry.

[0022] 11 is the 1st dipole sound source, and is on a dashboard 3, and is attached on extension of abbreviation Chuo Line of a driver's seat 5, and is constituted by arranging horn loudspeaker 11b which is horn loudspeaker 11a and the 2nd sound source which are the 1st sound source back to back. The directive shaft P1 of horn loudspeaker 11a turns to slanting back (right of drawing 1) towards the outside of a vehicle, the sound emitted from this horn loudspeaker 11a is reflected by side window 7a by the side of a driver's seat 5, the hearing point S1 of the driver's seat 5 which is a listening location is reached from right-hand side (upper part of drawing 1), and direct sound almost reaches the hearing point S1.

[0023] The directive shaft P2 of horn loudspeaker 11b accomplished the straight line with the reverse

sense with the directive shaft P1, the slanting front (left of drawing 1) is turned to towards in the car, it reflects in the front window 4 and the sound emitted from this horn loudspeaker 11b reaches the hearing point S2 from right-hand side.

[0024] 11c is the image source, when the sound from horn loudspeaker 11a reflects by side window 7a and reaches the hearing point S1, it is generated, and it is located in horn loudspeaker 11a and a symmetrical place on both sides of side window 7a. It is the 2nd dipole sound source and the configuration and the function are the same in the 1st dipole sound source 11, and 12 is on a dashboard 3 and is attached on extension of abbreviation Chuo Line of a passenger seat 6. Horn loudspeaker 12b which is horn loudspeaker 12a and the 4th sound source which are the 3rd sound source is the same as the aforementioned horn loudspeaker 11a and horn loudspeaker 11b.

[0025] Horn loudspeaker 11a turns to slanting back towards the outside of the vehicle of an opposite direction, the directive shaft P3 of horn loudspeaker 12a reflects the sound emitted from this horn loudspeaker 12a by side window 8a by the side of a passenger seat 6, the hearing point S2 of the passenger seat 6 which is a listening location is reached from left-hand side (down [of drawing 1]), and direct sound almost reaches the hearing point S2.

[0026] With the directive shaft P3, the directive shaft P4 of horn loudspeaker 12b has reverse sense, accomplishes a straight line, reflects the sound emitted from this horn loudspeaker 12b in the front window 4, and reaches the hearing point S1 of a driver's seat 5 from left-hand side.

[0027] 12c is the image source, when the sound from horn loudspeaker 12a reflects by side window 8a and reaches the hearing point S2, it is generated, and it is located in horn loudspeaker 12a and a symmetrical place on both sides of side window 8a.

[0028] 13 and 14 -- rear one -- business -- it is a loudspeaker. Q shows the directivity pattern of the 1st and 2nd dipole sound source 11 and 12.

[0029] 15 is a head unit used as the source of a signal. 16 is DSP which is a signal-processing means, and gives a predetermined electrical signal to the power amplification which drives each loudspeaker, respectively. the power amplification with which 17 drives the loudspeakers 9 and 10 for inside low-pass, the power amplification with which 18 drives the 1st and 2nd dipole sound source 11 and 12, and 19 -- rear one -- business -- it is the power amplification which drives loudspeakers 13 and 14. L is the signal of a left channel and R is the signal of a right channel.

[0030] An operation of this invention constituted as mentioned above is explained. the loudspeakers 9 and 10 attached in front doors 7 and 8 -- respectively -- the signal R of a right channel, and a left channel -- Signal L -- inputting -- the horn loudspeakers 11a, 11b, 12a, and 12b for high regions -- respectively -- R, -R (R and opposition), and - the signal of L and L is inputted.

[0031] In addition, a character property of 8 like the broken-line section Q shown in drawing 1 can be given by inputting into the horn loudspeakers 11a and 11b of the 1st dipole sound source 11 the signal R with which phases differ 180 degrees, and -R. The same is completely said of the 2nd dipole sound source 12.

[0032] With the above-mentioned signal, the sound emitted from the inner horn loudspeakers 11a and 12a of the loudspeaker for high regions is reflected in the side windows 7a and 8a, the hearing points S1 and S2 are reached from the right-hand side of a driver's seat 5, and the left-hand side of a passenger seat 6, respectively, and Signal R and the sound by -L are told. This can be heard like the sound emitted from the image sources 11c and 12c besides an aperture.

[0033] On the other hand, it reflects in the front window 4, the hearing points S2 and S1 are reached from the right-hand side of a passenger seat 6, and the left-hand side of a driver's seat 5, respectively, and the sound emitted from horn loudspeakers 11b and 12b is a signal. - The sound by R and L is told.

[0034] If only a high region is observed, in the hearing point S1 of a driver's seat 5, it will be a signal by the above setup to Signals L and R and the hearing point S2 of a passenger seat 6. - L and -R can reach coincidence through the abbreviation equal distance, and can acquire the central normal position in the hearing points S1 and S2, respectively.

[0035] Moreover, since the signal inputted into loudspeakers 9 and 10 to inside low-pass can be delayed by DSP16, as it becomes equal equivalent with the time of concentration of the sound emitted from the

image sources 11c and 12c besides the train window in a driver's seat 5 and passenger seat 6 each side, the central normal position can be clarified.

[0036] In addition, if it thinks focusing on a driver's seat 5 and only the signal inputted into a loudspeaker 9 will be delayed, the normal position by the side of a driver's seat 5 will become clearer. Conversely, if it thinks centering on a passenger seat 6, when only the signal supplied to a loudspeaker 10 is delayed, the normal position by the side of a passenger seat 6 will become clear. Thus, the position control which can change the good location of the normal position into arbitration is possible by controlling the signal inputted into loudspeakers 9 and 10 and horn loudspeakers 11a, 11b, 12a, and 12b.

[0037] Although the horn loudspeaker was used for the 1st, 2nd, 3rd, and 4th sound source 11a, 11b, 12a, and 12b which constitutes the 1st and 2nd die hole sound source 11 and 12 in this example, not only this but a direct radiation form loudspeaker may be used.

[0038]

[Effect of the Invention] vehicle indoor sound system ***** concerning this invention -- since it constituted as mentioned above, while the central normal position is realizable for coincidence in a driver's seat and a passenger seat, the image normal position can be set up out of a train window.

[0039] Moreover, an input signal can be delayed, or the signal inputted into each horn loudspeaker of a dipole sound source can be controlled, and the image normal position of driver's seat dominance and the image normal position of passenger seat dominance can be made to arbitration.

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TECHNICAL FIELD

[Industrial Application] This invention relates to a suitable vehicle indoor sound system to start the sound system for mount, especially improve the sound-source normal position.

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PRIOR ART

[Description of the Prior Art] As the conventional sound equipment for mount was shown in drawing 3, the loudspeakers 31 and 32 for high regions were attached in the vehicle room 2 of the Sedan type automobile 1 at a 7 or 8 front door front pillar or both the corners of a dashboard 3, and the loudspeakers 9 and 10 for inside low-pass were attached in front doors 7 and 8.

[0003] In any case, direct sound arrived at the driver's seat or the passenger seat, but since the location of a driver's seat and a passenger seat is unsymmetrical and distance differed to these loudspeaker locations, the image normal position was partial.

[0004] The physics top was impossible, although the loudspeaker needed to be attached so that it might be applicable also to which of a driver's seat and a passenger seat in order to improve this phenomenon.

[Translation done.]

JAPANESE [JP,06-072253,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF
DRAWINGS DRAWINGS

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] however, the above-mentioned conventional sound equipment for mount -- DSP (Digital Signal Processer) etc. -- even if it was going to delay a signal and was going to orientate an image in a listener's center, a driver's seat and a passenger seat were not able to be satisfied to coincidence.

[0006] Moreover, it was difficult to have made a sound orientate about a sound which is orientated to Lch or Rch in addition to the location of each loudspeaker.

[0007] This invention is made in view of the above-mentioned point, and the place made into that purpose cancels the fault of the conventional example, and is located in the place which offers the vehicle indoor sound system which an image orientates in the center of a driver's seat and each passenger seat.

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MEANS

[Means for Solving the Problem] While being attached in the dipole sound source, and the front door or dashboard for the high region playback attached on the dashboard, the vehicle indoor sound system of this invention is equipped with the loudspeaker and signal-processing means for low-pass one, and it constitutes them so that the sound from a dipole sound source and the sound from the loudspeaker for inside low-pass may arrive at a listening location at coincidence.

[0009] Moreover, the 1st dipole sound source attached on the dashboard near the driver's seat as said dipole sound source sideways or slanting sideways one, It has the 2nd dipole sound source attached on the dashboard near the passenger seat sideways or slanting sideways ones. The sound emitted from the 1st sound source among the 1st sound source and the 2nd sound source which constitute said 1st dipole sound source reflects in the side window of a drivers side, and reaches to a driver's seat. The sound emitted from the 2nd sound source reflects in a front window, and reaches to a passenger seat. It constitutes so that the sound emitted from the 3rd sound source among the 3rd sound source and the 4th sound source which constitute the 2nd dipole sound source may reflect in the side window of a passenger side, and may reach to a passenger seat, the sound emitted from the 4th sound source may reflect in a front window and it may reach to a driver's seat.

[0010] Moreover, it enables it to change the phase of the signal to each sound source which constitutes said dipole sound source with said signal-processing means.

[0011] Moreover, it enables it to delay the input signal to the loudspeaker for said inside low-pass with said signal-processing means.

[0012] Moreover, said dipole sound source carries out the loudspeaker for high regions back to back, and constitutes it.

[0013] Furthermore, a horn loudspeaker is used for said loudspeaker for high regions.

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OPERATION

[Function] Since according to this invention the loudspeaker for inside low-pass is arranged by a front door or the dashboard, a dipole sound source is attached on a dashboard and it is controlled by the signal-processing means, an image orientates in each listening location (a driver's seat and passenger seat).

[0015] Moreover, since the sound emitted from the 2nd sound source of the sound emitted from the 1st sound source of the 1st dipole sound source and the 3rd sound source of the 2nd dipole sound source and the 1st dipole sound source and the 4th sound source of the 2nd dipole sound source arrives at a driver's seat and a passenger seat through the path of the abbreviation equal distance, respectively, an image orientates to coincidence in the center of a driver's seat and each passenger seat.

[0016] Moreover, since it enables it to change the phase of the signal to each sound source which constitutes a dipole sound source, directional characteristics like the broken-line section Q which change the phase of the signal to each sound source 180 degrees, respectively, and are shown in drawing 1 can be given.

[0017] Moreover, since the input signal to an inside woofer can be delayed to a dipole sound source, and the sound from the loudspeaker for inside low-pass is delayed and it can arrive at a driver's seat and a passenger seat to the sound emitted from two dipole sound sources later than coincidence or it, an image is orientated in the center of a driver's seat and each passenger seat.

[0018] Moreover, since the loudspeaker for high regions is made a dipole sound source back to back, hard flow is turned to ** and the horn loudspeaker is moreover used for this loudspeaker, the outstanding directivity in a high region can be obtained.

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EXAMPLE

[Example] The example of the vehicle indoor sound system concerning this invention is explained based on drawing 1 and drawing 2. In addition, the same sign is given to the same part as the conventional example, and the explanation is omitted.

[0020] The top view and drawing 2 which show the example for which drawing 1 carried out this invention by Sedan type automobile are the block diagram showing the example of the loudspeaker connection used in order to carry out this invention.

[0021] As for 2, as for a vehicle room and 4, in drawing, a front window and 5 are a passenger seat and the side window where a driver's seat and 6 were prepared in 7a, and 8a was prepared in front doors 7 and 8. 9 and 10 are the loudspeakers for inside low-pass, they turn the inside to both the front doors 7 and 8, and interior is carried out to bilateral symmetry.

[0022] 11 is the 1st dipole sound source, and is on a dashboard 3, and is attached on extension of abbreviation Chuo Line of a driver's seat 5, and is constituted by arranging horn loudspeaker 11b which is horn loudspeaker 11a and the 2nd sound source which are the 1st sound source back to back. The directive shaft P1 of horn loudspeaker 11a turns to slanting back (right of drawing 1) towards the outside of a vehicle, the sound emitted from this horn loudspeaker 11a is reflected by side window 7a by the side of a driver's seat 5, the hearing point S1 of the driver's seat 5 which is a listening location is reached from right-hand side (upper part of drawing 1), and direct sound almost reaches the hearing point S1.

[0023] The directive shaft P2 of horn loudspeaker 11b accomplished the straight line with the reverse sense with the directive shaft P1, the slanting front (left of drawing 1) is turned to towards in the car, it reflects in the front window 4 and the sound emitted from this horn loudspeaker 11b reaches the hearing point S2 from right-hand side.

[0024] 11c is the image source, when the sound from horn loudspeaker 11a reflects by side window 7a and reaches the hearing point S1, it is generated, and it is located in horn loudspeaker 11a and a symmetrical place on both sides of side window 7a. It is the 2nd dipole sound source and the configuration and the function are the same in the 1st dipole sound source 11, and 12 is on a dashboard 3 and is attached on extension of abbreviation Chuo Line of a passenger seat 6. Horn loudspeaker 12b which is horn loudspeaker 12a and the 4th sound source which are the 3rd sound source is the same as the aforementioned horn loudspeaker 11a and horn loudspeaker 11b.

[0025] Horn loudspeaker 11a turns to slanting back towards the outside of the vehicle of an opposite direction, the directive shaft P3 of horn loudspeaker 12a reflects the sound emitted from this horn loudspeaker 12a by side window 8a by the side of a passenger seat 6, the hearing point S2 of the passenger seat 6 which is a listening location is reached from left-hand side (down [of drawing 1]), and direct sound almost reaches the hearing point S2.

[0026] With the directive shaft P3, the directive shaft P4 of horn loudspeaker 12b has reverse sense, accomplishes a straight line, reflects the sound emitted from this horn loudspeaker 12b in the front window 4, and reaches the hearing point S1 of a driver's seat 5 from left-hand side.

[0027] 12c is the image source, when the sound from horn loudspeaker 12a reflects by side window 8a

and reaches the hearing point S2, it is generated, and it is located in horn loudspeaker 12a and a symmetrical place on both sides of side window 8a.

[0028] 13 and 14 -- rear one -- business -- it is a loudspeaker. Q shows the directivity pattern of the 1st and 2nd dipole sound source 11 and 12.

[0029] 15 is a head unit used as the source of a signal. 16 is DSP which is a signal-processing means, and gives a predetermined electrical signal to the power amplification which drives each loudspeaker, respectively. the power amplification with which 17 drives the loudspeakers 9 and 10 for inside low-pass, the power amplification with which 18 drives the 1st and 2nd dipole sound source 11 and 12, and 19 -- rear one -- business -- it is the power amplification which drives loudspeakers 13 and 14. L is the signal of a left channel and R is the signal of a right channel.

[0030] An operation of this invention constituted as mentioned above is explained. the loudspeakers 9 and 10 attached in front doors 7 and 8 -- respectively -- the signal R of a right channel, and a left channel -- Signal L -- inputting -- the horn loudspeakers 11a, 11b, 12a, and 12b for high regions -- respectively -- R, -R (R and opposition), and - the signal of L and L is inputted.

[0031] In addition, a character property of 8 like the broken-line section Q shown in drawing 1 can be given by inputting into the horn loudspeakers 11a and 11b of the 1st dipole sound source 11 the signal R with which phases differ 180 degrees, and -R. The same is completely said of the 2nd dipole sound source 12.

[0032] With the above-mentioned signal, the sound emitted from the inner horn loudspeakers 11a and 12a of the loudspeaker for high regions is reflected in the side windows 7a and 8a, the hearing points S1 and S2 are reached from the right-hand side of a driver's seat 5, and the left-hand side of a passenger seat 6, respectively, and Signal R and the sound by -L are told. This can be heard like the sound emitted from the image sources 11c and 12c besides an aperture.

[0033] On the other hand, it reflects in the front window 4, the hearing points S2 and S1 are reached from the right-hand side of a passenger seat 6, and the left-hand side of a driver's seat 5, respectively, and the sound emitted from horn loudspeakers 11b and 12b is a signal. - The sound by R and L is told.

[0034] If only a high region is observed, in the hearing point S1 of a driver's seat 5, it will be a signal by the above setup to Signals L and R and the hearing point S2 of a passenger seat 6. - L and -R can reach coincidence through the abbreviation equal distance, and can acquire the central normal position in the hearing points S1 and S2, respectively.

[0035] Moreover, since the signal inputted into loudspeakers 9 and 10 to inside low-pass can be delayed by DSP 16, as it becomes equal equivalent with the time of concentration of the sound emitted from the image sources 11c and 12c besides the train window in a driver's seat 5 and passenger seat 6 each side, the central normal position can be clarified.

[0036] In addition, if it thinks focusing on a driver's seat 5 and only the signal inputted into a loudspeaker 9 will be delayed, the normal position by the side of a driver's seat 5 will become clearer. Conversely, if it thinks centering on a passenger seat 6, when only the signal supplied to a loudspeaker 10 is delayed, the normal position by the side of a passenger seat 6 will become clear. Thus, the position control which can change the good location of the normal position into arbitration is possible by controlling the signal inputted into loudspeakers 9 and 10 and horn loudspeakers 11a, 11b, 12a, and 12b.

[0037] Although the horn loudspeaker was used for the 1st, 2nd, 3rd, and 4th sound source 11a, 11b, 12a, and 12b which constitutes the 1st and 2nd die hole sound source 11 and 12 in this example, not only this but a direct radiation form loudspeaker may be used.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the top view showing the example which carried out this invention by Sedan type automobile.

[Drawing 2] It is the block diagram showing the example of the loudspeaker connection used in order to carry out this invention.

[Drawing 3] It is the top view showing the example which carried the conventional example in the Sedan type automobile.

[Description of Notations]

- 1 Automobile
- 2 Vehicle Room
- 3 Dashboard
- 4 Front Window
- 5 Driver's Seat
- 6 Passenger Seat
- 7 Eight Front door
- 7a, 8a Side window
- 9 Ten Loudspeaker
- 11 1st Dipole Sound Source
- 11a, 11b, 12a, 12b Horn loudspeaker
- 11c, 12c Image source
- 12 2nd Dipole Sound Source
- 13 and 14 rear one -- business -- loudspeaker
- 15 Head Unit
- 16 DSP
- 17, 18, 19 Power amplification

[Translation done.]

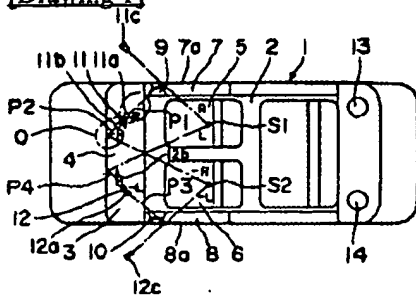
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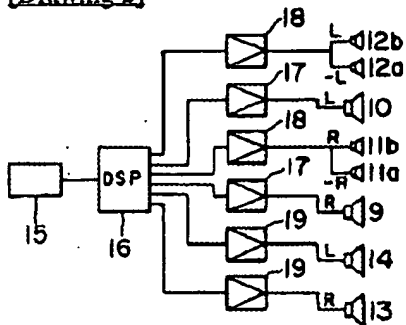
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DRAWINGS

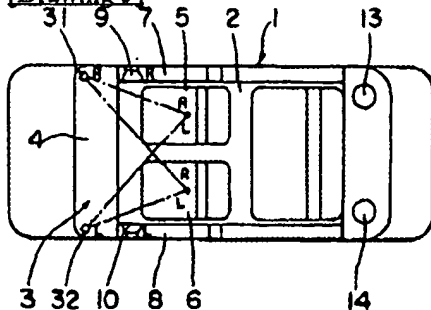
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]